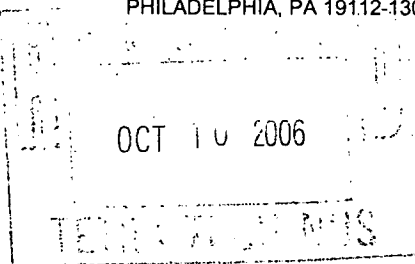




DEPARTMENT OF THE NAVY  
BASE REALIGNMENT AND CLOSURE  
PROGRAM MANAGEMENT OFFICE, NORTHEAST  
4911 SOUTH BROAD STREET  
PHILADELPHIA, PA 19112-1303

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NAS WILLOW GROVE  
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Code BPMP/RL  
Ser: 06-060  
September 30, 2006

Ms. Lisa Bradford (3HS11), Remedial Project Manager  
U.S. EPA Region 3  
1650 Arch Street  
Philadelphia, PA 19103-2029

Subject: DRAFT FEASIBILITY STUDY FOR SITE 5 - FIRE TRAINING  
AREA GROUNDWATER (OU 2), SEPTEMBER 2004, NAVAL AIR STATION JOINT  
RESERVE BASE, WILLOW GROVE, PA

Dear Ms. Bradford:

The Navy's responses to EPA comments on the subject draft  
Feasibility Study for Site 5 Groundwater are provided as  
enclosure (1). Based on these comments and responses, the  
document will be revised and a Draft Final Feasibility Study  
will be submitted.

If you have any questions, please do not hesitate to  
contact me at (215) 897-4908.

Sincerely,

Robert F. LEWANDOWSKI, P.E.  
By direction of BRAC PMO

Enclosure:

(1) Navy Responses to Comments from USEPA Region III on  
the Draft Feasibility Study for Site 05 - Fire Training Area,  
Groundwater (OU 2), September 2004 (EPA Comments dated June 6,  
2005)

Copy to:

J. Edmond, NASJRB Willow Grove  
C. Frye, FEC MIDLANT  
A. Flipse, PADEP  
R. Turner, TtNUS

**NAVY RESPONSE TO EPA COMMENTS  
DRAFT FEASIBILITY STUDY FOR SITE 5 – FIRE TRAINING AREA  
GROUNDWATER (OU 2), SEPTEMBER 2004**

**(EPA Comments dated January 6, 2005)**

General Comment: *The subject report and the Proposed Remedial Action Plan (PRAP) should include an analysis of the results from the ground water sampling effort in June 2004. Prior to including this analysis in these reports, a copy should be provided to EPA for our review and input. It is recommended that Tetra Tech provide EPA the results with interpretation and analysis for EPA input.*

General Response: Agree. The results of the June 2004 Site 5 groundwater sampling were submitted to EPA, PADEP and the NAS JRB RAB for comment on January 12, 2005 (presentation by Kevin Kilmartin). The data will be included as an appendix to the Final Site 5 GW FS and will be referenced in the final PRAP as requested.

In the one and one half years since the EPA submitted these comments, the Navy has responded to the EPA hydrologist observations and concerns expressed in these EPA comments by performing a number of investigations/actions related to Site 5 soil, hydrogeology and groundwater status concerns. The Navy performed resampling and analysis of site soils using currently preferred soil sampling techniques to confirm the soil sampling results from the 1997 remedial investigation. The Navy installed five new boreholes and eight new monitoring wells, performed geophysical logging, packer studies, and analysis of groundwater samples to respond to EPA hydrochemistry, hydrogeology and health risk concerns noted in these comments. The Navy is also in the process of a soil removal action in the vicinity of the "burn ring" at Site 5 that has demonstrated that the "burn ring" was actually a section of a cast iron tank with an intact bottom riveted below ground that precluded greater contamination in the burn area itself. These recent investigations further clarify and confirm the site conceptual model presented in the RI/FS.

Specific Comments:

*1. It is unclear whether the private supply wells were ever sampled to determine whether they are impacted or not. Given that the ground water gradient is toward the residential area, it is important that a well survey and residential well sampling be performed, if not performed historically. If a survey and residential well sampling was performed, this should be noted in the subject document and reference made to the report of findings.*

Response: A residential well survey was performed and is summarized on Figure 1-3 of the Site 5 GW FS. If EPA requests, the data analysis for residential well sampling performed on November 22, 1996 (already part of the Site 5 RI report) can be included as an appendix to the Final Site 5 GW FS. The Navy will also include a figure showing the home wells sampled.

The addresses of the home wells sampled in 1996 were: 521 Horsham Road, 611 Horsham Road, 815 Horsham Road, and 821 Horsham Road. All Home wells were analyzed for VOC's (EPA method 502.2). All analysis results were non-detect except for the well located at 815 Horsham Road which had two detects: 1,1-Dichloroethene (1,1-DCE) at 2.8 µg/L and 1,1,1-trichloroethane (1,1,1-TCA) at 1.9 µg/L. These levels are below the maximum contaminant level (MCLs) and medium-specific concentrations (MSCs) for residential groundwater. The MCL's are 7 µg/L for 1,1-DCE and 200 µg/L for 1,1,1-TCA. PADEP was notified of the groundwater investigation

results and resolved the issues with the home owner (it was determined that a source other than the Navy was probable). The home has been connected to the public water supply.

*2. It is recommended that ground water samples be analyzed for 1, 4-dioxane as there is a high concentration of 1,1,1-trichloroethane (1,4-dioxane is used as a solvent stabilizer for 1,1,1-tca) at monitoring well 05MW01S and the Target Compound List (TCL) doesn't include this compound. It is especially important because its chemical properties make it more mobile than the other volatile contaminants (1-4, dioxane plume can be twice as long as the chlorinated solvent plume) and, if present at levels of concern, its treatment isn't amenable to the technologies proposed in the Feasibility Study (FS). The following URL provide information on 1,4-dioxane.*

*<http://clu.in.org/contaminantfocus/default.focus/sec/1,4-Dioxane/cat/Overview/>*

Response: Agree. In response to these comments submitted by EPA, the Navy has obtained groundwater samples from all thirty three Site 5 and two nearby monitoring wells for analysis of 1, 4-dioxane using EPA SW-846 Method 8270C. A detection limit of 2.1 ug/L was achieved for most analyses. The only detection of 1,4-dioxane was in 05MW01S (the shallow well in the Site 5 historical source area according to the site conceptual model), with a concentration of 13ug/L (12 ug/L in the field duplicate sample from that well). The EPA Region 3 RBC is 6.1 ug/L. Monitoring well 05MW01S historically has the highest 1,1,1-TCA of all Site 5 monitoring wells.

*3. In a fractured bedrock aquifer, predictive modeling is difficult if not impossible to rely on as representative data for ground water. Ground water samples must always be collected to confirm projected model results to verify that the model is accurately representing site conditions. Consequently, modeling should not be relied on to evaluate risk or considered to add 'protection to human health' as indicated in Table 3-2 of the Effectiveness narrative for Alternatives 2 and 4. Modeling can be appropriately used to identify areas for sampling (data gaps) or identify areas that need monitoring to evaluate risk. It is, therefore, recommended that modeling not be relied on to evaluate risk or to represent existing or future ground water contamination without collection of representative ground water samples as suggested in Table 3-2. Please have Tetra Tech remove this statement in this table and in any other portions of the subject report.*

Response: Agree. Any text that indicates that modeling is relied on to evaluate risk or considered to add protection to human health will be removed. Table 3-2 will be revised accordingly.

*4. Using the information provided in the February, 2002 Remedial Investigation Report in tandem with the hydrogeologic characteristics of the Stockton Aquifer, it appears that some of the monitoring wells may not have been screened across the zone of interest (i.e. most contaminated water bearing zone) or optimally placed to intersect the likely flow pathway emanating from the observed highest contaminated ground water (i.e. 05MW01S). As part of my evaluation, I roughly interpreted 2 cross sections parallel to bedding strike and 2 cross sections perpendicular to bedding strike (i.e. based on the reported bedding strike of N76E and dip of 7 degrees to the northwest). The following are of note:*

- 1) The down dip well clusters 12 and 3 do not have a screened interval that intersects the zone monitored by 05MW01S, the most contaminated monitoring well. These well cluster locations are screened above and below this zone.*

- 2) *There are no monitoring wells located along strike of the most contaminated well 05MW01S and most importantly in the direction of the residential wells (about midway between well cluster locations 5 and 4).*

Response: Agree. In response to these comments submitted by EPA, the Navy prepared a work plan for groundwater investigations (that was reviewed and approved by EPA) to perform additional hydrogeological and chemical analysis to address each of these concerns regarding the Site 5 conceptual model. The Navy installed five new boreholes and eight new monitoring wells, performed geophysical logging, packer studies, and analysis of groundwater samples to respond to EPA hydrochemistry, hydrogeology and health risk concerns noted in these comments.

1) The Navy installed and sampled the downdip well 05MW12S to monitor the same stratigraphic interval as monitoring well 05MW01S. The low concentration of total VOCs at 05MW12S indicates that the dip of the bedrock is not exerting a major structural control on the migration of the plume.

2) The Navy installed and sampled four new monitoring wells at two new well clusters (05MW14 and 05MW15) located downgradient from, and directly along strike of the source area. The lower concentrations in these wells (relative to those detected along the plume axis) indicate that the strike of bedrock is not exerting a major structural control on migration of the plume.

3) The Navy also installed and sampled the new monitoring well cluster 05MW13 northwest (downgradient) of monitoring well clusters 05MW04 and 05MW05 and 03MW08 to further define the downgradient extent of the Site 5 plume and the upgradient extent of the Site 3 plume.

5. *Section 1.1.4 Groundwater Occurrence and Flow Characteristics. Third paragraph, last statement indicates that "the vertical gradient between the water table and the deeper zones with the aquifer is one tenth of a foot of head difference per foot of vertical elevation, or an order of magnitude higher than the vertical gradient at the shallower depths." This increase in downward gradient could correspond to production from public and/or industrial supply wells in the area. Please have Tetra Tech include potential explanations for the increased downward gradient.*

Response: Agree. The Navy agrees that the hydraulic head within the deeper aquifer in the southern portion of the site (in the vicinity of cluster 05MW11) is lowered by the pumping of wells, and an appropriate discussion will be added to the report text. The Navy notes, however, that investigations have indicated that proportionally, the reduction in head caused by the pumping is small when compared to the total head difference that is measured in that area, and that overall, the lower head is believed to reflect ambient hydrogeological conditions.

The Navy and the USGS conducted a long-term water level study to determine the effects of pumping by the nearby Horsham Water and Sewer Authority (HWSA) well no. HWSA-26 (see USGS Water-Resources Investigations Report 01-4263). From this study, the USGS concluded that the pumping of HWSA-26 had no effect on the hydraulic heads of the shallow and intermediate wells at cluster 05MW11, but had a measurable effect on the hydraulic head of the deep well. Further, the USGS noted that the hydrograph for this well displayed a response to the pumping of two wells (HWSA-26 and an unknown well). Upon the shutdown of HWSA-26, however, the USGS noted that the recovery at 05MW11 did not exceed about 0.2 feet, which is small when compared to the total vertical head difference of 18.51 feet that was measured at this location in

September 2000. In fact, adding the recovered hydraulic head only decreases the vertical hydraulic gradient from 0.153 to 0.151.

The Navy concludes that the pumping of HWSA-26 (which is a deep well that yields hundreds of gallons per minute) has a small contribution, but is certainly not the primary cause of the vertical hydraulic gradient measured in the southern portion of Site 5. It is also doubtful that the pumping of the limited number of private residential wells (which typically are shallower and have much lower yields) could produce significant drawdown.

*6. Section 1.1.5 Groundwater Flow Directions. Last paragraph, the last two statements. Since 05MW10 and 05MW05 are located toward the direction of off site public and private supply wells, a possible explanation for steeper downward vertical gradients at these wells could be that the supply wells to the south are likely a discharge point for deeper ground water and consequently could influence ground water flow direction and gradient. Please reflect this in the report narrative.*

Response: Agree. Please see the reply to the previous comment. An appropriate discussion will be inserted into the report narrative. The USGS study concluded that the pumping of HWSA-26 did have a measurable, but minimal effect the hydraulic head in the southern portion of Site 5 (in the vicinity of well cluster 05MW11). Although well clusters 05MW05 and 05MW07 were not monitored as part of the long-term water level study, they are located several hundred feet further upgradient of HWSA-26 from 05MW-11. Therefore, although the pumping of HWSA-26 may be affecting the hydraulic head in these areas, the drawdown effects at 05MW05 and 05MW07 would be expected to be less than (or, at best, equivalent to) the minimal drawdown effects observed at 05MW11.

*7. Section 1.3.3 Potential Effect of Geological Structure on Plume Migration. Based on the reported strike of N 76°E, dip of 7° NW, monitoring well 05MW12I wasn't screened across the same bedding interval where the highest ground water contamination was detected at monitoring well 05MW1S. In order to evaluate this aquifer for DNAPL or the most contaminated portion of the ground water plume, monitoring wells should be placed along strike (on either side of MW1S) and within the same bedding interval down dip of 05MW1S. My calculations indicate that 05MW12I top of screen interval is 50 feet too deep to monitor the same bedding interval as MW1S.*

Response: Agree. In response to this comment submitted by EPA, the Navy installed and sampled the downdip well 05MW12S to monitor the same stratigraphic interval as monitoring well 05MW01S. The low concentration of total VOCs at 05MW12S indicates that the dip of the bedrock is not exerting a major structural control on the migration of the plume.

*8. Section 1.3.4 Public Supply Well-Horsham Township Municipal Authority Well No. 26. It is recommended that a couple of sentences discuss the potential effect that future production from the aquifer to the south could have on ground water flow and contaminant migration in this sections narrative.*

*Also, the residential well use should be discussed, particularly the distance to the closest residential well with respect to the contamination detected, depth range of the home wells should be provided.*

Response: Agree. The Navy will add a discussion on the potential effect that future production from the aquifer to the south could have on groundwater flow and contaminant migration. The Navy worked with USGS during the pumping tests to determine if the hydraulic head at Site 5 was

influenced by the pumping of HTMA No. 26. HTMA well No. 26 groundwater quality information will be provided if available from the owner.

When residential wells were sampled in 1996 the home well located between Site 5 and HTMA No. 26 (611 Horsham Road) did not have any detections for volatile organic compounds (VOCs). The home wells have not been sampled (by the Navy) since. Sentinel well 05MW11 was installed at the request of EPA to monitor the potential for groundwater flow toward the residences. The September 2000 sampling round for 05MW11 showed only two exceedences (benzene and chloroform (both estimated)) at levels only slightly above the risk based concentrations (RBCs) for tap water. The June 2004 sampling showed no VOC detections in any of the three 05MW11 monitoring wells.

9. *Section 1.4.2 Natural Attenuation (NA) of Contaminants and Section 1.4.3 Conclusions. Based on the data presented in the RI of OU 2 (2002) and the subject FS report, the following conclusions stated in the last paragraph are inappropriate. Additionally, the NA screening was not performed consistent with EPA recommended protocol.*

- 1) *"hydrogen concentrations were high and oxygen concentrations were low, indicating that anaerobic conditions prevail at many of the sample locations."*
- 2) *"Laboratory analytical results of other indicator parameters such as the presence of chlorinated hydrocarbon degradation products (ethane, ethane and methane) indicate that NA of chlorinated hydrocarbon compounds would be favored in this matrix, and in fact is occurring in groundwater at Site 5."*

*The following (in EPA/600/R-98/128 Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, September 1998, URL: <http://www.epa.gov/superfund/resources/gwdocs/monit.htm> ) explain why these conclusions are inappropriate, and provides my technical basis for disagreeing.*

- 1) *Given the source area use as a fire training area, (i.e. spent solvents were placed in trenches and pits, set on fire and then extinguished,) most, if not all of the contaminants that could be considered daughter products could be explained as materials released there. The Preliminary Screening for Anaerobic Biodegradation Processes presented in EPA/600/R-98/128 (page 29) based on the minimum NA parameters sampled and analyzed for at this site would yield a score of 3 using the data from Table 1-5 in the subject report (i.e. H<sub>2</sub>>1nM/L-+3 points, CO<sub>2</sub> has not been demonstrated to be >2X background-0 points, O<sub>2</sub> is not < 0.5 mg/L-0 points, nitrogen couldn't be scored as it should have been analyzed as nitrate, methane was not present at wells >.5 mg/L-0 points, ethane was not present > 0.1 mg/L nor was ethene present > 0.01 mg/L.) This score of 3 would be interpreted in the EPA protocol as "inadequate evidence of anaerobic biodegradation of chlorinated organics."*
- 2) *Furthermore, while the hydrogen concentrations would provide the potential for reductive de-chlorination, the oxygen concentrations detected at the site monitoring wells would not be conducive to anaerobic conditions.*
- 3) *The monitoring wells are not likely placed within the centerline of the contaminant plume. As stated in my previous comments, the monitoring wells down dip are not screened across the highest contaminated water-bearing zone nor are there wells located along strike of the most highly contaminated well, 05MW01S, which are preferential ground water flow pathways in the Stockton aquifer. Consequently, there are no representative samples within the heart of the contaminant plume between the source*

*area and potential receptors to complete a proper natural attenuation and/or fate and transport evaluation.*

Response: The Navy does not agree that the NA screening was not performed consistent with the EPA recommended protocol. Using the EPA "lines of evidence" evaluation protocol presented in OSWER Monitored Natural Attenuation Directive 9200.4-17P, dated April 21, 1999, pages 13 to 16, and the latest combined data set for Site 5 groundwater, and then comparing the results to EPA's Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater the Navy concludes that there is "limited evidence" of ongoing anaerobic biodegradation of chlorinated organics in site 5 groundwater. The Site 5 groundwater contaminated plume scores 9 points using monitoring well 05MW02S as a background well (1 point for alkalinity, 2 points for nitrate, 2 points for chloride, 3 points for hydrogen and 1 point for carbon dioxide).

1) Navy will change to "hydrogen concentrations were high and most oxygen concentrations were below 5 mg/L, indicating that anaerobic biodegradation tolerant conditions prevail at many of the sample locations."

2) We see no reason to change this sentence. If EPA prefers, this sentence could be dropped as not essential.

1) According to the site conceptual model, the source area of the VOC groundwater plume is believed to be the former drum storage area, not the former burning area. The center of the drum storage (source) area is thought to approximately coincide with the location of 05MW01, approximately 180 feet due west of the former burning area (as defined by the center of the remnant burning ring). No significant VOC contamination plume has been encountered in groundwater east of the 05MW01 presumed source area. Accordingly, based on the site conceptual model, only unburned solvents contributed significantly to the observed groundwater plume.

Preliminary screening for the suitability of anaerobic biodegradation processes and the EPA Biochlor model were performed for the RI report (2002). Both tasks were performed in accordance with EPA guidance and are summarized in Appendix B of the FS (2004). According to the RI report, the predominant groundwater flow direction is west (deeper groundwater) and southwest (shallow depths), potentially toward Horsham Township well No. 26 (see RI Figures 4-7 and 4-8). Based on the wells selected to perform the screening tasks (monitoring wells 05MW01S, 05MW01SI, 05MW07S, 05MW07I, 05MW08S, 05MW08SI, 05MW08I, 05MW09S, 05MW09SI, 05MW09I, 05MW10S, 05MW10SI, 05MW10I, 05MW11S, 05MW11SI and 05MW10I. See Table H-1 on Page B-3 of the FS), preliminary screening for anaerobic biodegradation processes using EPA guidance yielded a score of 8 or greater (limited evidence of anaerobic biodegradation), indicating at least tolerance for anaerobic biodegradation processes.

Based on all data, using 05MW02S as the designated background well, following the preliminary screening for anaerobic biodegradation process in Table 2.3 of the Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water by EPA, there is limited evidence of anaerobic biodegradation of chlorinated organics. For all data, the score is 9 points. The score is based on the following conditions:

- 1 point for alkalinity
- 2 points for nitrate
- 2 points for chloride
- 3 points for hydrogen
- and 1 point for carbon dioxide

Also, the analytical data for each well shows a decreasing concentration trend for 1,1,1-TCA in all aquifers and in most cases for the daughter products. Based on the three tiered approach using the OSWER Directive dated April 21, 1999, pages 13 to 16, site data shows a decrease in contaminant mass, and hydrogeologic data shows low flow through the aquifers, implying that anaerobic activity is occurring slowly at the site.

Any remedial alternative relying exclusively on monitored natural attenuation (MNA) at the site would take a long time due to limited conditions favoring (tolerating) anaerobic biodegradation; however this method should not be dismissed. If bio-enhancement methods are used, anaerobic biological degradation will be applicable.

2) Oxygen in two shallow (water table) wells, 05MW03S and 05MW04S, exceeds the toleration level (5 mg/L) for anaerobic biodegradation of the chlorinated solvent, indicating that anaerobic biodegradation would be unlikely in the shallow zone of those two wells that are not in the more concentrated source area. The Navy has proposed three viable remedial action alternatives (Alts. 3A, 4 and 5) consisting of source area remediation carried through to the practical technology endpoint, followed by subsequent long term monitoring until the aquifer meets criteria for unrestricted use. These candidate remedial action alternatives follow EPA guidance promoting application of MNA in conjunction with active source area remediation.

3) The Navy believes that with the additional monitoring wells and groundwater sampling performed in response to these EPA comments, adequate data exist to evaluate the remedial alternatives for Site 5 groundwater. As discussed in the replies to several earlier comments, the Navy believes that the data collected to date and the site conceptual model indicate that it is the bedrock fractures, rather than the strike and dip of the bedrock, that are primarily controlling the migration of the plume.

*10. Table 1-6 Selection of Chemicals of Potential Concern in Groundwater – Site 5. It is recommended that the site toxicologist review this table since it appears that some of Tap Water Risk-Based Concentrations (RBCs) are significantly different by an order of magnitude or more for some of the COPCs (most notably TCE and PCE).*

Response: Agree. After discussions with EPA and PADEP, the Navy prepared a Site 5 groundwater technical memorandum of human health risk assessment (HHRA Tech Memo) to recalculate estimated health risks that may have changed as a result in changes to risk assessment guidance or toxicity factors and assumptions in the years since the original HHRA was performed (1997/1998). Updated risks were presented in current risk assessment guidance tabular format and a discussion pointed to variance from the “old” HHRA.

*11. Section 2.1.1.1 Potential Chemical-Specific ARARs and TBCs. Second paragraph, first statement should be changed as follows: While there are no water supply wells used for drinking water located at Site 5, ground water from the aquifer underlying site 5 is used as a potable source of drinking water through individual private and public wells in close proximity to site 5.*

Response: Agree. The change has been made.

12. *Section 2.2.2 Human Health Protection Considerations. Second paragraph, first statement should be changed as follows: While there are no water supply wells used for drinking water located at Site 5, ground water from the aquifer underlying site 5 is used as a potable source of drinking water through individual private and public wells in close proximity to site 5.*

Response: Agree. The change has been made.

13. *Table 2-5 Preliminary Remediation Goals. It is recommended that the EPA toxicologist review and provide input on this table. The 5 ug/L proposed PRG for TCE is unlikely acceptable, as it would place the risk well outside the  $10^{-4}$  to  $10^{-6}$  range.*

Response: EPA Region 3 toxicologist Linda Watson presented the Navy with two different methods for calculating the PRGs for TCE at our 9/27/06 NASJRB Willow Grove team meeting. Navy will review the two methods presented and then decide which method will be used in this case.

14. *Section 2.3.2 Site 5 Preliminary Remediation Goals. Second paragraph, first statement: Correct the typo, the table referenced here is Table 1-6.*

Response: Agree. The correction has been made

15. *Table 2-6 Preliminary Identification, Screening and Evaluation of Technologies. Because 1) critical wells were not located appropriately (i.e. along strike between the residential wells and down dip); 2) residential wells do not appear to have been sampled and they are very close to site 5 known contaminated ground water (appears to be less than 1000 feet to nearest resident from monitoring well 05MW051); 3) 1,4-dioxane may be present; and 4) the NA preliminary screening results per EPA protocol would indicate that there is inadequate evidence that NA through anaerobic degradation is occurring, it is inappropriate to retain Natural Attenuation and In-Situ Biological Anaerobic technologies as alternatives to remediate site 5, at this time. The remainder of the document should be changed to remove consideration of these two technologies for further consideration, at this time.*

Response: The Navy does not agree with this comment. In the one and one half years since the EPA submitted these comments, the Navy has responded to the EPA hydrologist observations and concerns expressed in these EPA comments by performing a number of investigations/actions related to Site 5 soil, hydrogeology and groundwater status to address EPA concerns. All work performed supports the site conceptual model and the Alternatives development in the FS.

1) The Navy installed and sampled four new monitoring wells at two new well clusters (05MW14 and 05MW15) located downgradient from, and directly along strike of the source area. The lower concentrations in these wells (relative to those detected along the plume axis) indicate that the strike of bedrock is not exerting a major structural control on migration of the plume.

2) Residential wells were sampled in 1996. Results are available in several locations, including in the reply to Comment number 1.

3) In response to these comments submitted by EPA, the Navy obtained groundwater samples from all thirty three Site 5 and two nearby monitoring wells for analysis of 1, 4-dioxane using EPA SW-846 Method 8270C. A detection limit of 2.1 ug/L was achieved

for most analyses. The only detection of 1,4-dioxane was in 05MW01S (the shallow well in the Site 5 historical source area according to the site conceptual model), with a concentration of 13ug/L (12 ug/L in the field duplicate sample from that well). The EPA Region 3 RBC is 6.1 ug/L.

4) The Navy does not agree that the NA screening was not performed consistent with the EPA recommended protocol. Using the EPA "lines of evidence" evaluation protocol presented in OSWER Monitored Natural Attenuation Directive 9200.4-17P, dated April 21, 1999, pages 13 to 16, and the latest combined data set for Site 5 groundwater, and then comparing the results to EPA's Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater the Navy concludes that there is "limited evidence" of ongoing anaerobic biodegradation of chlorinated organics in site 5 groundwater. The Site 5 groundwater contaminated plume scores 9 points using monitoring well 05MW02S as a background well (1 point for alkalinity, 2 points for nitrate, 2 points for chloride, 3 points for hydrogen and 1 point for carbon dioxide).

*16. Section 3.1.2.1 Alternative 1: No Action, Existing Features. The narrative should be revised. There is no "primary protective feature" in the aquifer underlying site 5. Additionally, the ground water in the aquifer underlying site 5 is used as a potable water supply by nearby residents and community. It appears that residential wells are located much closer than 1700 feet from the known ground water contamination emanating from site 5. It is recommended that this entire narrative be removed.*

Response: Agreed, changed text to reflect this comment. The text now reads "Currently, site features offer no protection of human health and the environment. The primary protective feature is that underlying groundwater at Site 5 is moving slowly and has not gone off-base. As a result, there is currently no pathway for human exposure to VOC-contaminated groundwater. However, potable water supply wells are situated elsewhere in the vicinity of Site 5 (HTMA Well No. 26 is approximately 1,700 feet and the closest residence using a private well, is within 1,000 feet of the plume boundary) and site groundwater as it continues to move could conceivably be used as a potable water supply in the future, posing a potential excess human health risk.

*17. Section 3.1.2.2 Alternative 2: Monitored Natural Attenuation and Section 3.1.2.5 Alternative 4: In-Situ Treatment of Groundwater by Enhanced Biological Anaerobic Reductive Dehalogenation, and Monitored Natural Attenuation. As per my previous comments regarding NA at this site, each technology should be removed from consideration, at this time. Please have Tetra Tech revise report.*

Response: The Navy does not agree with this comment. Please refer to the reply to comments under Section 1.4.2 Natural Attenuation (NA) of Contaminants and Section 1.4.3 Conclusions. Additional evaluation of anaerobic biodegradation evaluation information can be added to backup these Alternatives.

*18. Section 4.2.1 Alternative 1: No Action Long Term Effectiveness and Permanence. Second paragraph, last statement should be changed as follows: There are no potable supply wells on the site 5 property and there are no existing future plans for potable wells on this property, however, public non-community and domestic wells are less than 1000 feet from the detected ground water contamination in the Stockton aquifer the same aquifer that underlies site 5.*

*This narrative is repeated in each of the Alternatives either in the Long Term Effectiveness and Permanence portion or in the Overall Protection of Human Health and the Environment portion.*

Response: Agreed, made the changes.

*19. Section 4.2.2 Alternative 2: Monitored Natural Attenuation and Section 4.2.4 Alternative 4: In-Situ Treatment of Groundwater by Enhanced Biological Anaerobic Reductive Dehalogenation and Monitored Natural Attenuation. As indicated per my previous comments regarding NA at this site, each Alternative should be removed from the report narrative.*

Response: Based on the additional investigation and presentation of results in the past year and one half since these EPA comments were submitted, that support the site conceptual model presented in the RI report and the FS and indicate a tolerance for NA, the Navy believes that the EPA comment no longer applies.

*20. Section 4.2.5 Overall Protection of Human Health and the Environment. First paragraph, last statement: It is unclear what is meant by this statement. Please have Tetra Tech clarify.*

Response: The sentence will be deleted. Sentence does not add any additional information that was not already stated in the previous two.

*21. Section 4.2.5 Short Term Effectiveness. Last paragraph: Correct typo. This is discussion for alternative 5 not 4.*

Response: Agreed, corrected typo.

*22. Section 4.3 Comparative Analysis of Site 5 Alternatives The second paragraph should be removed for the same reason that Section 4.3.8 Recommended Remedial Alternative was removed.*

Response: Based on the additional investigation and presentation of results in the past year and one half since these EPA comments were submitted, that support the site conceptual model presented in the RI report and the FS and indicate a tolerance for NA, the Navy believes that the EPA comment no longer applies.

*19. Section 4.3.1 Overall Protection of Human Health and the Environment. Paragraph 1: Alternative one shouldn't include monitoring as it is no action.*

Response: Agreed. The requested change will be made.

*20. (Section 4.3.1) Paragraph 2: Alternative two would require monitoring to ensure that the plume doesn't expand and that ground water remediation is occurring within the predicted timeframe.*

Response: Agreed. Will add the following statement "Long-term periodic monitoring and 5-year reviews would provide the Navy and regulatory agencies the opportunity to review site conditions and perform additional remedial actions if they become warranted."

*21. (Section 4.3.1) Paragraph 3: Alternative 3A wouldn't facilitate NA but would certainly prevent the continued migration of contaminated ground water. Please have Tetra Tech revise the narrative to reflect the preceding comments.*

Response: Agreed. Changed statement to say "...above-ground treatment should facilitate the degradation of the source material and remediation of contaminated groundwater."